Sask Research Council

# A BRIEF HISTORY of

1947

# 25

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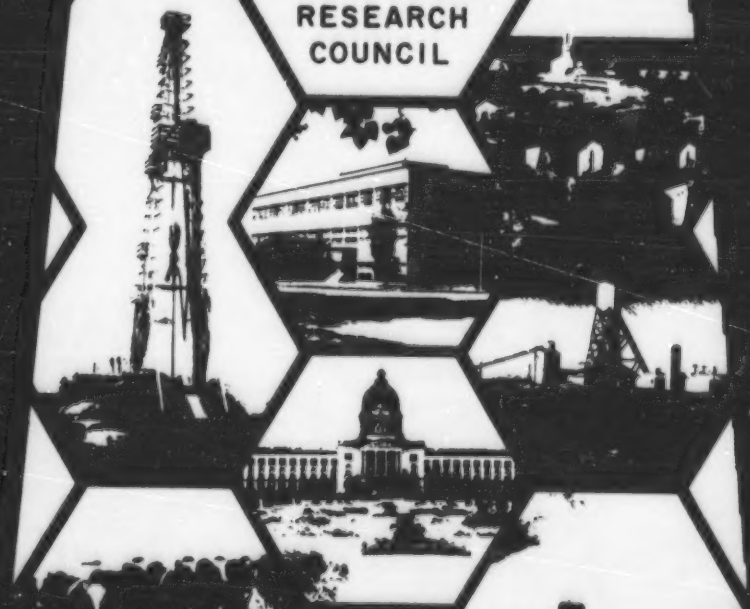
## the SASKATCHEWAN RESEARCH COUNCIL



by

T. E. WARREN

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# INTRODUCTION

The years immediately following the Second World War were especially favourable to establishment of a scientific research organization in Saskatchewan. Science and technology were in high repute, new research tools such as radioactive isotopes were developing and new subjects for scientific study were being recognized. It is not surprising that the government of Saskatchewan proceeded, in 1947, to establish the Saskatchewan Research Council.

This was not the first attempt to do so. In 1930 the government of the *Honourable J.T.M. Anderson* had created a scientific research council whose membership included *Dr. Walter C. Murray* of the University of Saskatchewan. The economic conditions, however, made it impossible to continue and the annual report for 1932 submitted the statement that: "under existing conditions the Research Council can only keep in touch with the industrial and economic investigations being carried on elsewhere, as it is not possible to secure funds for any original research work".

Interest in a provincial research agency was revived in 1945 and a meeting of representatives of the University and government regarding research was held on July 23rd of that year. The meeting was convened by the *Honourable J.H. Sturdy* and *Dr. T. Thorvaldson* was the chairman. It was proposed by *President J.S. Thomson*

DR. T. THORVALDSON

that the government and University efforts on research projects be co-ordinated by the University Research Advisory Committee whose members were appointed from the University faculty. Discussions continued during 1946 between *Dr. Thorvaldson*, *Mr. C.A.L. Hogg*, who was Assistant Deputy Minister of Natural Resources and *Mr. T.H. McLeod*, who was Secretary of the Economic Advisory and Planning Board. Gradually the concept developed of a research organization acting under the control of the government with the scientific and technical participation of the University. The Act establishing the Saskatchewan Research Council was put into effect on April 1st, 1947.

MR C.A.L. HOGG

## COUNCIL ESTABLISHED

The Act provided that members of the Council be appointed by the Lieutenant Governor in Council and that three of their members be of the faculties of physical sciences and engineering of the University. The duties of the Council were to "be responsible for considering any or all matters pertaining to research and investigation in the fields of the physical sciences as they affect the economy of the Province of Saskatchewan and such particular matters as may be brought to their attention from time to time by the Lieu-

tenant Governor in Council". In order to execute these duties the Council was empowered to "employ such personnel, including a full-time director of research, purchase such materials and equipment, and maintain such facilities as are necessary for the conduct of its operations" and to "carry on research, investigations and studies for other persons or bodies upon such terms and conditions as may be decided upon by the Council and approved by the Lieutenant Governor in Council".

On June 3, 1947, by Order-in-Council 946/47 the following persons were appointed to membership:

*The Honourable W.S. Lloyd*, Chairman
*Dean L.E. Kirk*
*Dr. T. Thorvaldson*
*Dean R.A. Spencer*
*Mr. C.A.L. Hogg*
*Mr. E.E. Eisenhauer*
*Mr. E. Brockelbank*
*Mr. T.H. McLeod*

THE HON. W.S. LLOYD

A further order-in-council, issued on September 10, 1947, appointed *Dr. V.E. Graham* and *Dr. W.A. Riddell* to membership.

The first meeting of the Council was held on July 15, 1947. Various items of procedure were established including appointment of a Technical Committee whose members were: *Dr. Thorvalson*, Chairman; *Dean Spencer; Dr. Graham; Mr. Hogg;* and the Director of Research who was to be appointed. The duties of the Technical Committee were to act with the Director of Research on all technical matters as well as acting as a liason with the University Research Advisory Committee. It was agreed that the Council should request the provincial government for the sum of $20,000 to carry out its activities for the remainder of the year.

With its organization established and with funds to begin a small research program the Council was able to start a course of action that continued without any fundamental charge except growth for the next ten years.

## THE UNIVERSITY YEARS

The period that can be called "The University Years" comprises the time during which the Council did not have facilities or staff and the research was conducted by University staff in their own laboratories. It can be defined as beginning with the start of the Council in 1947 and lasting until a laboratory building had been constructed and occupied by the Council's staff in 1958.

During this time the program of research was initiated mainly by members of the University faculty. Members of the scientific colleges and departments were invited to submit applications for grants for research projects that were relevant to some aspect of the provincial economy. The applications were screened by the Technical Committee and recommended for approval to the Council. The available funds, provided by the provincial government, were then distributed as grants-in-aid to successful applicants. The grants-in-aid were used only to provide a small remuneration to student assistants and for special equipment and operating expenses. There was no charge for laboratory accomodation and the faculty members who directed the work were not paid.

The first topics that were proposed and accepted for support

by the Council are listed in the annual report for 1948, which was the first full year of operation. Directors and titles of these topics are as follows:

*C.R. Forsberg* - Water Hardness Investigation
*W. Graham* - Research on Lignite
- Lloydminster Asphalt
*E.A. Hardy* - Special Irrigation Pumps
- Lubrication Research
*J.M. Humphrys* - Effect of Electrolytes on Properties of Saskatchewan Ball Clays
*J.M. Pepper* - Research on Poplar Lignin
*J.G. Rempel* - Mosquito Investigation
*J.W.T. Spinks* - Investigations of Leonardite
- Tracer Research

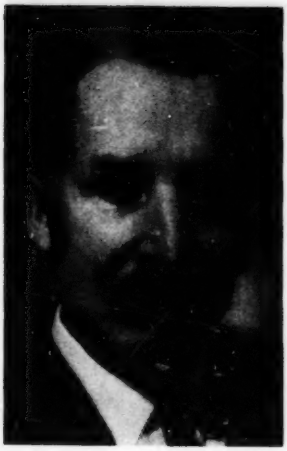
Even at this early date a pattern of interest became evident. Although the topics were proposed independently they can be classified under the headings of water, mineral resources, natural resources and assistance to agriculture.

The nature of the program,was of course, influenced by the Technical Committee and the Co-ordinator of Research. During the University years, in addition to the original members, *Dean I.N. Fraser, Dr. E.Y. Spencer* and *Dean J.W.T. Spinks* served on the Technical Committee. *Dr. Spinks* was chairman from 1951 on. The Council did not at first employ a full-time director but appointed a Co-ordinator of Research who divided his time between University and Council duties. The first person to occupy this office was *Dr. E.Y. Spencer* who served from 1949 to 1951. *Dr. Thorvaldson* succeeded him and remained in the office until 1956.

## EXECUTIVE COMMITTEE

Administrative business of the Council was conducted by the Executive Committee. Members of the Committee appointed at the first meeting of the Council were: *Hon. W.S. Lloyd, Mr. E.E. Eisenhauer, Dr. W.A. Riddell* and *Mr. T.K. Shoyama*. Later, at various

DR. E. Y. SPENCER



DEAN J. W.T. SPINKS

MR. T. K. SHOYAMA

times during the University years, the Executive Committee also included *Mr. E.E. Brockelbank, Dean I.M. Fraser, Dean V.E. Graham, Mr. C.A.L. Hogg, Mr. T.H. McLeod, Dean J.W.T. Spinks* and *Dr. T. Thorvaldson*. A large part of the administration work was done by the Council's secretary, *Mr. T.K. Shoyama*, who initiated many of the administrative procedures that are still in use.

The Council functioned efficently in co-operation with the University and under the guidance of its committees and special officers but there were inherent limitations in the University grant system. These stem mainly from the fact that most of the research was done by graduate students. Their work on a project ended when they had completed a master's or doctor's thesis whether the Council's economic objective had been reached or not. A student could not be expected to accept assignment to a project, however useful, if it did not have sufficent academic significance to justify award of a degree. It was difficult to intensify work on urgent or important projects by assigning additional personnel to them. It was also difficult to schedule work done under contract. There was a conflict of interests with regard to publication of results obtained under contract with industrial clients.

With these limitations in mind the Council began, in 1952, to consider establishing its own research facilities.

The first step towards this end was revision of the Research Council Act. In 1953 the Council gave consideration to amendments aimed at improved administrative flexibility and opening the way for support from non-governmental sources. In 1954 the Legislature approved a new *Research Council Act*. The intent of the original Act and most of the constitutional structure were retained but the new act established the Council on a broader financial basis. It was empowered to receive outright grants from the provincial government and to receive directly such grants, revenues, payments or endowments as it might require from other sources. It was anticipated that, as the value of scientific research became more widely recognized, there would be a corresponding growth of support for the Council by industry.

As the next step towards the long range objective the Council submitted a brief to the provincial government proposing that permanent headquarters, laboratories and other facilities be established and a full-time technical staff appointed. It was expected that the establishment would operate as a centre of scientific knowledge, undertake industrial research and testing, provide technical help in starting new industries and assist in the formulation of government programs for industrial development.

When the proposal had been approved the Council began to recruit a permanent staff and to plan construction of a laboratory building. Previously an office had been provided for the Co-ordinator of Research in the Chemistry Building on the Saskatoon Campus. The Council's first fulltime employee, *Mrs. F.V. Elvin*, had been appointed on October 19, 1953, as secretary to *Dr. Thorvaldson*.

An arrangement was made in 1954 for the Council to take over supervision of the field work of the National Research Council's Technical Information Service in Saskatchewan. It was agreed that the NRC should provide a grant of $10,000 per year to assist in financing the services. Headquarters of the Technical Information Officer were to be at the SRC office at the University in Saskatoon; he was to work under the direction of the Co-ordinator of Research and maintain active co-operation with the National Res-

MRS. F.V. ELVIN

MR IBHAR S. EVANS

earch Council and other federal agencies as well as several departments of the provincial government. *Mr. Ibhar S. Evans* was appointed Technical Information Officer on November 20, 1954.

With the development of plans for increased scope of the Council's work it became essential that a Director be appointed. The position had been established at the first meeting of the Council in 1947 and candidates for it had been considered from time to time. At a meeting on June 18, 1955, the Council decided to intensify the effort to recruit a Director. Advertisements were placed in scientific journals and daily newspapers and *Dr. Thorvalson, Mr. Hogg,* and *Mr. Shoyama* were appointed to a committee to screen the applications. On December 19, 1955, it was agreed to offer the position to *Dr. T.E. Warren.* He accepted the offer and began work in Saskatoon in January, 1956.

## FACILITIES CONSOLIDATED

The Industrial Minerals Research Branch of the Department of Mineral Resources had been conducting a program of research that was similar to part of the program that had been planned for the Council. By agreement with the Department the Industrial Minerals Research

DR. T. E. WARREN

Branch joined with the Council on April 1, 1956. It was not until two years later that the Council's facilities in Saskatoon were ready for occupancy and during that time the Branch continued its work in its laboratory in Regina.

An Appointments Committee was established on December 20, 1956, to assume responsibility for recruiting. The first members of the committee were: *Mr. C.A.L. Hogg, Mr. W.O. Longworthy, Dean J.W.T. Spinks, Dr. T. Thorvaldson* and *Dr. T.E. Warren.* It was decided that the Committee's first program should be to recruit senior personnel and it began immediately to advertise in scientific journals and in newspapers in Canadian centres of scientific population. Inquiries were also directed to the National Research Council, the National Employment Service and the Agent General of the Government of Saskatchewan in the United Kingdom.

A Building Committee was constituted on June 18, 1955 to arrange for the services of an architect and undertake supervision of the planning of the building. Members of the Committee were: *Mr. C.A.L. Hogg, Dean I.M. Fraser, Dean V.E. Graham, Dean W.A. Riddell, Dean J.W.T. Spinks* and *Dr. T. Thorvaldson.* The firm of *Izumi, Arnott and Sugiyama* prepared the building design, assisted

by *Mr. E.Y. Carlson. The W.C. Wells Construction Company, Ltd.*, submitted the low tender on the building and were awarded the contract.

The building was completed early in 1958 and the official opening was on October 1, 1958.

## GROWTH AND PRODUCTION 1958 TO 1972

The Council continued to support research in the University laboratories after its own facilities were established. The main reason is that the University has greater scope in science and can therefore conduct research in fields that are outside the skills of the Council's staff. The combination of University laboratories conducting far reaching reconnaissance and the Council's staff concentrating on the more promising topics has been especially effective.

Scholarships are one means by which the Council has promoted research in the University. From its earliest years the Council has administered the Province of Saskatchewan Graduate Research Scholarships. These have increased in value from $600 per year in 1951 to $3200 per year in 1972. The purposes of the scholarships are to assist graduate students to prepare for careers in scientific and industrial research and to create interest in the development of resources and techniques that will advance the economy of the Province. Usually three scholarships per year are awarded and so assistance has been provided for more than 70 students. Some of these have achieved scientific prominence in the Council, the University and elsewhere.

Grants-in-aid are the other means by which the Council has continued to support research in the University. The procedure for initiation and selection of projects has remained essentially the same since it was started in 1947. It is in the nature of such a program to be very diverse. For instance the program for 1958 comprised 24 projects in eleven departments. Expenditure by the Council on projects in the University for the fiscal year ended March 31, 1958, was $47,654. The Corresponding figure for the year ended March 31, 1971, was $71,715. Allowing for the change

in the price index the real increase in the program was about 20 per cent.

## AIDING THE ECONOMY

The design of the Council's organization, facilities and work program had begun about 1956 and was well advanced by the time the building was finished and occupied. To begin with, it was recognized that the purpose of the Council is to provide technical information that will help to advance the economy of the Province. The Saskatchewan economy was known to have the following characteristics:

- its growth has been retarded by inadequate water supply;
- in recent years its growth has been promoted by the expansion of mineral production;
- agriculture has been the mainstay of the economy;
- transportation has been a major problem;
- much thought and effort are spent in efforts to build up the industrial sector.

It could be seen that several lines of investigation would need to be followed and that the Council's organization would need to be versatile in order to adjust to changes in the program. It was decided therefore, to organize the staff according to discipline rather than to project and divisions of chemistry, engineering, geology, physics and industrial services were established. A division of administration was added to conduct the business functions. When the building was occupied, early in 1958 all five division heads had been recruited and the staff totalled 19 persons. The staff has grown over the years as the work program has increased and at the time of writing (March, 1972) the total staff numbers 98 including temporary employees. The number of the latter increases during the summer months when students are employed for field work and to assist in the laboratories.

The first step towards provision of facilities for the Council was taken in 1957 when the main laboratory building was constructed. It was decided that the most suitable location would be on the University campus in Saskatoon and the University provided a lot at nominal rent. The main structure is 130 feet long and 50 feet wide

with a pilot plant area 60 feet by 48 feet forming a T at the back. Initially the building had two storeys. Most of the construction was done in 1957 and the building was completed, furnished and occupied in 1958. Early in 1961 a storage building; having a floor area of 6000 square feet, was completed on the same lot as the main building. In 1963 a third storey was added to the main building. Late in 1966 a new building for contract projects was acquired. It was a small factory located on Quebec Avenue in Saskatoon. It has been used to house the large scale equipment for the slurry pipeline project. Modifications have been made to the main building and to the storage building in order to accommodate the library, conference room, receiving and dispensing of stores, geology laboratory, duplicating equipment and instrument shops. Field accommodations for meteorology and various water studies have been set up at numerous locations in the Province.

## FINANCIAL SUPPORT

Financial support for the Council's work has increased substantially during the period under consideration, partly because of increased grants from the Province of Saskatchewan and also because of increased revenue from other sources. The grant from the Province for the year ended March 31, 1959, was $375,000. For the year ended March 31, 1971, it was $1,035,340. In the fiscal year 1958-59 revenues other than the provincial grant amounted to only $22,835. In the fiscal year 1970-71 the corresponding figure was $395,023. Thus the revenues other than the provincial grant have risen from 6 per cent of the total at the beginning of the period to 28 per cent at the end. Over the 12 year period total revenues have increased at the average rate of 11 per cent per year.

The projects that have been undertaken by the staffs of the Council and the University are all consistent with the general purpose of the Council but within this broad limitation they have been selected individually with a view to the probability of obtaining useful results. The program of research that has resulted appears, therefore, to be very diverse. Its classification can be simplified, however, if the projects are grouped according to objective. This arrangement gives an interesting insight into the Provinces's main technical problems and opportunities which occur in the fields of water supply, mineral resources, agriculture, industry and transportation.

Inadequate water supply is traditionally one of Saskatchewan's most serious problems and trends towards urbanization and establishment of industry have made it more acute. A large part of the Council's effort has therefore been directed towards increasing the availability of underground, surface and atmospheric water.

The mineral industry in Saskatchewan has developed very rapidly in recent years and a major part of the research program has been applied to the discovery, production and utilization of mineral resources. In southern Saskatchewan projects have been con-

ducted that apply to salt, potash, sodium sulphate, clay, lignite, petroleum, natural gas and helium. In northern Saskatchewan projects have been directed to the discovery and production of metals.

Agriculture has been assisted mainly through work in the University laboratories with financial support from the Council. The Council's staff have also contributed through projects in the fields of weather science, atmospheric pollution and water supply.

Assistance to industry constitutes another group of the Council's activities. Its objectives are to provide technical assistance for improving the efficiency of existing industry and for establishing new industries in the Province. This work is conducted by the Council's staff with support from the National Research Council through its Technical Information Service.

Transportation in general presents many problems to the Saskatchewan economy. The Council's main effort in this field has been applied to research on conveyance of solids in slurry form in pipes.

There are ordinarily about 60 projects in progress at any given time in the Council's laboratories and about 20 more in the University laboratories. A comprehensive account of the whole program is published each year in the annual report of the Council but in this review it will be possible to select only a few examples of the individual projects for comment.

## WATER STUDIES

Geological studies applied to groundwater have been conducted for several years by the Council with financial assistance from ARDA. Test drilling has now been nearly completed in all of the occupied areas of the Province and maps are being prepared which show the major aquifers, establish the base for groundwater exploration and provide a regional framework for on-site groundwater investigations. The economic benefits from the improved understanding of groundwater are: provision of widely distributed supplies of water for livestock, for the sodium sulphate and other industries, and for many farms and several urban communities; reduction of losses from unproductive drilling; and increase in property values. The value of the project is illustrated by the

fact that in 1971 there were 125 written requests for information concerning location and quality of groundwater, exploration techniques and well design. In addition it is estimated that more than 250 requests were processed by personal interview and telephone. These came from farmers, towns, municipalities, consultants and government agencies. Field trips, short courses, lectures and displays were organized throughout the year to provide training for technical personnel in government agencies and for groundwater users.

Assessment of groundwater quality by chemical analysis constituted another project that received ARDA assistance. A total of over 2,000 groundwater supplies covering the populated area of the Province were sampled and analysed. The results were organized on a grid pattern and a system of chemical classification was devised. Using the tables and maps in the report on this project it is possible to estimate the quality of groundwater at any given location and depth. A further analytical survey applying to surface water has also been completed.

A project on pesticide spray studies funded by an extra-mural grant from the Canada Department of Agriculture was started in 1966 and continued up to the present (1972). Its purpose is to examine the physical factors governing the production, dispersal and deposition of pesticide spray droplets and relate this knowledge to the prairie climate so that recommendations can be drawn up by agriculturalists concerning their use by farmers. Testing of various spray devices, investigation of deposition patterns and problems and determination of the major drift hazards are all involved in this project. This work will enable agriculturalists to improve the efficiency of crop spraying and particularly to minimize hazards due to herbicides or insecticides drifting from the spray area to adjoining fields.

In 1960 the Saskatchewan Power Corporation contracted with the Council to determine the capacity of the Boundary Dam generating station at Estevan as limited by the capability of the reservoir to supply the necessary quantities of cooling water. This is dependent on the amount of water supplied to the reservoir and on losses from seepage, natural evaporation and forced evaporation. Theoretical estimates were verified by a continuing

program of hydrological and meteorological measurements. In 1965 the Power Corporation decided to increase the capacity of the station from 132 to 432 magawatts. This program has been completed. One result is that lignite consumption has been increased from one million tons per year to 3 million tons per year.

A major part of the work of the Division of Industrial Services of the Council applies to manufacturing. This Division conducts the Technical Information Service, supported by the National Research Council, as well as other functions. In helping industry to solve its scientific, technical and engineering problems the method of operation is to visit all of the industries in the Province insofar as this is possible and to acquaint industry with science and technology through publication of a monthly newsletter, the Catalyst, and a quarterly information circular, Scientific and Technical Digests. The Technical Information Service has answered more than 30,000 questions submitted by industries in Saskatchewan.

A project begun early in the Council's history by the Department of Civil Engineering of the University, supported by a grant from the Council, has made an important contribution to the science of building construction. It was known that excessive foundation movements occur very generally in highly plastic clay areas, not only in heavy, multi-storey masonry structures but also in relatively light single-storey frame buildings. It was found that footing movements in such soils were not caused by excessive loads but rather by volume changes in the supporting clay due to changes in its water content. When the cause of foundation failures became known, several ways to overcome the problem were devised. One that has been widely used is to place the footings deep enough below the surface so that the water content of the supporting clays is constant. This technique has made a major contribution to the value of buildings constructed in the Province.

The examples that have been outlined give an impression of the relevance of the Council's work to the provincial economy but it is not possible to estimate the value of the whole program with satisfactory precision. It is probably safe to assume, however, that the value is greater than the total cost.